



# Periyar Arts College

**Cuddalore**

Re-Accredited with "B" Grade by NAAC

DEPT : DEPARTMENT OF COMPUTER SCIENCE

SUBJECT : MOBILE COMPUTING -UNIT-II

CLASS : II M.Sc.CS

WELCOME TO ALL

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# UNIT-II SYLLABUS

Overview of Mobile IP –  
Features of Mobile IP –  
Key Mechanism in Mobile IP –  
route Optimization.

Overview of TCP/IP –  
Architecture of TCP/IP-  
Adaptation of TCP Window –  
Improvement in TCP Performance.

# Overview of Mobile IP

## Mobile IP: Internet Protocol

IP is responsible for delivering data packets across the Internet network on their addresses.

Each Computer must have an IP address before it can meaningfully connect to the Internet. That is each IP packet must have destination IP address before it can be sent to another computer.

# Overview of Mobile IP

## Overview of Mobile IP:

The goal of mobile IP is to enable packet transmission efficiently without any packet loss and disruptions in the presence of host and/or destination mobility.

There are two broad categories of solutions to this problem being faced by the business executive:

- i) Address changing.
- ii) Decoupling mail routing from his address.

# Features of Mobile IP

## Features of Mobile IP :

Some of the features required of mobile IP are the following.

**Transparency:** A mobile end-system should continue to keep its IP address and there should not be any disruption of communication after any movement. In other words the IP address is to be managed transparently and there should not be any effect of mobility on any on-going communication.

**Compatibility:** Mobile IP should be compatible with the existing Internet protocols.

# Features of Mobile IP

**Security:** Mobile IP should , as far as possible , provide users with secure communications over the Internet.

**Efficiency and Scalability:** In the event of worldwide support, there can be a large number of mobile system in the whole Internet. This should neither result in large number of message nor should it incur too much computational overhead. It should also be scalable to support billions of moving hosts worldwide.

# Key Mechanism in Mobile IP

## Key Mechanism in Mobile IP :

Mobile IP is associated with the following three basic mechanisms:

- i) Discovering the care-of-address
- ii) Registering the care-of-address
- iii) Tunnelling to the care-of address

A schematic diagram of Mobile IP is shown Fig 4.2. The specific protocols used by the basic mechanisms have also been shown. Observe that the registration process works over UDP and the discovery protocol over ICMP.

User Datagram Protocol (**UDP**) – a communications protocol that facilitates the exchange of messages between computing devices in a **network**.

"Internet Control Message Protocol (ICMP)." When information is transferred over the Internet, computer systems send and receive data using the TCP/IP protocol. If there is a problem with the connection, error and status messages regarding the connection are sent using **ICMP**, which is part of the Internet protocol.

# Route Optimization

## Route Optimization:

In the mobile IP protocol , all the data packets to the mobile node go through the home agent. Because of the this there will be heavy traffic between HA and CN in the network, the following route optimization needs to be carried out to overcome this problem.

- \* Enable direct notification of the corresponding host.
- \* Direct tunnelling from the corresponding host to the mobile host.
- \* Binding cache maintained at the corresponding host.

The mobile IP scheme needs to support the four message.

The association of the home address with a care-of-address is called binding .



# Route Optimization

## Message Type

## Description

1. **Binding request:** If a node wants to know the current location of a mobile node(MN), It sends a request to home agent(HA).
2. **Binding acknowledgement:** On request, the node will be return an acknowledgement message after getting the binding update message.
3. **Binding update:** This is message sent by HA to CN mentioning the correct location of MN. The message contain the fixed IP address of the mobile node and the care-of-address. The finding update can request for an acknowledgement.
4. **Binding warning:** If a node decapsulates a packet for a mobile node (MN), but it is not current foreign network agent(FA), then this node sends a binding warning to the home agent(HA) of the mobile node(MN).

# Overview of TCP/IP

## Overview of TCP/IP:

(Transmission Control Protocol/Internet Protocol) TCP is a standard transport layer protocol. In mobile computing, TCP is possibly the most popular transport layer protocol. UDP is connectionless and does not guarantee reliable data delivery. But, TCP on the other hand, guarantees reliable data delivery between two applications. TCP needs some special adaptations for use in mobile applications.

**User Datagram Protocol :(UDP)** – a communications protocol that facilitates the exchange of messages between computing devices in a **network**. It's an alternative to the transmission control protocol (TCP). In a **network** that uses the Internet Protocol (IP), it is sometimes referred to as **UDP/IP**.

TCP is responsible for breaking data down into IP packets before they are sent, and for assembling the packets when they arrive.

# Overview of TCP/IP

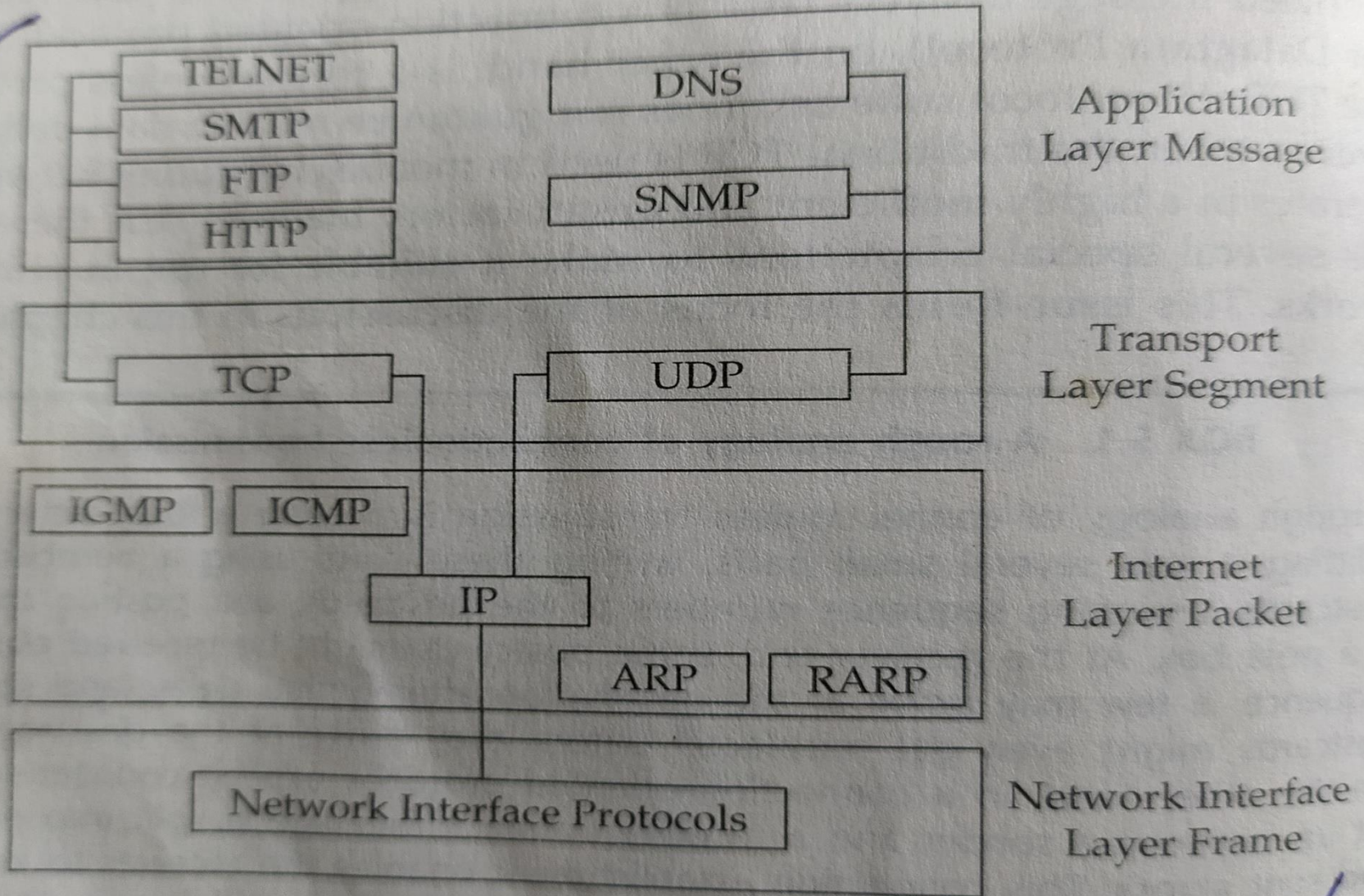


Figure 5.1 TCP/IP protocol stack.

# Overview of TCP/IP

TELNET: The remote log-on facility.

SMTP: Simple Mail Transfer Protocol.

FTP : File Transfer Protocol.

HTTP : Hyper Text Transfer Protocol- Communication between web server and a web browser.

DNS : Domain Name Sever.

SNMP : Simple Network Management Protocol.

IGMP : Internet Group Management Protocol.

ICMP : Internet Control Message Protocol.

ARP : Address Resolution Protocol.

RARP: Reverse Address Resolution Protocol.

# Architecture of TCP/IP

## Architecture of TCP/IP:

The TCP/IP protocol consists of four layers as shown given. These layers are: Application layer, Transport layer, Internet layer, and Network access layer. The functionalities of each layers are discussed below:

Application layer,  
Transport layer,  
Internet layer, and  
Network access layer

# Architecture of TCP/IP

## Application Layer:

The protocols at this layer are used by applications to establish communication with other application which may possibly be running on separate hosts.

Examples: http, ftp, and telnet.

## Transport Layer:

It provides reliable end-to-end data transfer services. The term end-to-end means that the end points of a communication link are applications or process. Sometimes protocols at this layer are also referred to as host-to-host protocols. The transport layer provides its services by making use of the services of its lower layer protocols. This layer includes both connection-oriented(TCP) and connectionless(UDP) protocols.

# Architecture of TCP/IP

## Internet Layer:

The internet layer packs data and data packets that are technically known as IP datagrams. Each IP datagram contains source and destination address (also called IP address) information that is used to forward the datagrams from the sender to destination through the network. The internet layer is also responsible for routing of IP datagrams. This layer manages addressing of packets and delivery of packets between networks using the IP address.

**Definition:** A *datagram* is an independent, self-contained message sent over the network whose arrival, arrival time, and content are not guaranteed.

IP : Internet Protocol

IGMP : Internet Group Management Protocol.

ICMP : Internet Control Message Protocol.

ARP : Address Resolution Protocol.

RARP: Reverse Address Resolution Protocol.

# Architecture of TCP/IP

## Network Access Layer:

The function of this protocol layer include encoding data and transmitting at the signalling determined by the physical layer. It also provides error detection and packet framing functionalities. The functionalities of this layer actually consist of the functionalities of the two lowermost layers of the ISO/OSI protocol suit, namely data link and physical layers. The data link layer protocols help deliver data packets by making use of physical layer protocol.

A few popular data link layer protocols are Ethernet, Token Ring, FDDI, and X.25.



# Adaptation of TCP Window

## Adaptation of TCP Window:

Adaptation implies the ability of a system to adjust to bandwidth fluctuation without inconveniencing the user.

The local system sends the remote end an initial sequence number to the remote port, using a SYN packet. The remote system responds with an ACK of the initial sequence number and the initial sequence number of the remote end in a response SYN packet.

**Reference:** Fundamentals of Mobile Computing, Second Edition.  
by- Prasant Kumar Pattnaik and Rajib Mall.  
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THANKS TO ALL

